1. Requested Task

Interpretation differences in addressing Flight Crew Alerting 25.1322.

1.1 Background

The regulation 25.1322 addresses various aspects of flight crew alerting. A revision of 25.1322 was initiated in 2002 through an FAA Aviation Rulemaking Advisory Committee (ARAC), which included FAA, EASA, TCCA and industry participation. FAA published its final rule and guidance on 02 November 2010 as amendment 25-131 to 14 CFR part 25, and EASA published its final rule and guidance on 27 June 2011 as part of CS-25 Amendment 11.

Despite the fact that the rule and associated guidance material are harmonized, there are significant differences in interpretation between authorities. On this basis this topic was proposed and accepted to be handled by Certification Authorities for Transport Airplanes (CATA), which is comprised of the European Union Aviation Safety Agency (EASA), the Federal Aviation Administration (FAA), Transport Canada Civil Aviation (TCCA), and the Agência Nacional de Aviação Civil (ANAC). A Subject Matter Expert (SME) group was set up and the group held regular meetings but failed to converge on harmonized interpretation.

The Certification Management Team (CMT) decided to restart the group as a Task Specific Team (TST) in December 2021 to address one aspect of the interpretation of the regulation, namely the use of failure flags on Primary Flight Displays (PFD). The TST was active from March 2022 until January 2023 and reached a consensus. The report produced by the TST was approved by the CMT on February 9, 2023 and has been implemented by all four authorities ANAC (Brazil), EASA (EU), FAA (US) and TCCA (Canada). The report is published on the FAA and EASA websites:

https://www.faa.gov/aircraft/air_cert/design_approvals/transport/transport_intl/cata/cmts_tst_25_1322

https://www.easa.europa.eu/en/document-library/bilateral-agreements/cmts-tst-certification-management-team-secretariat-task-specific-team

Following the publication of the TST report, the CMT extended the TST to a second phase to:

- address a subset of the remaining open items listed in the TST report, and
- prepare a tasking statement for a joint industry and authority group (ARC or ARAC) to address the remaining items.

2. Policy developed in TST Phase II

This document outlines the policy developed in response to the tasking for Phase II of the TST 25.1322.

2.1 Policy on Alerting for Loss of Guidance during Instrument Approach

The TST task was to harmonize the interpretation for the alerting requirements for loss of guidance during approach.

The CMT 25.1322 TST considers that in the event of loss of guidance during an instrument approach, a Warning is not mandated.

Loss of Guidance

The term 'loss of guidance' is not defined in the regulation. For the purpose of this policy, the TST determined that this would mean the loss of any one of the following functions:

- The loss of deviation display information.
- The loss of the capability to conduct the approach due to failure of on-board equipment (e.g. failure of a multi-mode receiver).
- The loss of the capability to conduct the approach due to failure of off-board equipment (e.g. failure of the ILS facility).

Analysis of the Regulatory Requirements

The TST did not consider the alerting requirements for specific instrument operations such as automatic landing or loss of autopilot.

The TST considered the following regulatory requirements:

- 25.1322(b)(1) 'Warning: For conditions that require immediate flight crew awareness and immediate flight crew response'.
  - The TST concluded that although immediate pilot awareness of a failure would be required, immediate action would not always be required. In particular, a go-around would not always be necessary. The factors affecting the pilot response (altitude, meteorological conditions, the precise nature of the failure mode) are too variable to make a simplistic determination regarding pilot action.
- 25.1309(c) 'A warning indication must be provided if immediate corrective action is required'
  - The TST applied the same logic as for 25.1322(b)(1); it is not appropriate for the regulation to make a simplistic determination of the nature or timeliness of the pilot response for this failure case. Moreover, this sentence has been removed from CS-25 from Amdt 24.
- CS-AWO 253(a) Initial Issue, for Cat II approaches: 'Audible Warning of Automatic Pilot Disengagement: Where the approach flight path is controlled automatically, an audible warning must be given following disengagement of the automatic pilot or *loss of the automatic approach mode*'.
  - The TST noted the applicability of the regulation to the autopilot and considered that it would not be relevant to manually-flown approaches. Having discussed the intent of this regulation, the TST agreed that it should be interpreted as requiring an alert for an uncommanded mode change in autopilot operation. The TST also considered that the word 'warning' should be interpreted as 'alert'; this is coherent with its application to existing designs (e.g. the 'triple-click' in Airbus aircraft for uncommanded mode change).

The TST also noted that in Issue 2 of EASA's CS-AWO, the regulation had altered significantly:

- For Cat I, SA Cat I and Cat II approaches, there are no specific alerting requirements.

- CS-AWO.B.CatIII.120: ‘Any malfunction of the landing system or of the xLS facility which requires a missed approach shall be positively and unambiguously annunciated to each pilot, so that pilot action may be initiated promptly without further interpretation. (See AMC 25.1322)’.
- AMC AWO.A.110 Controls, Indicators and Alerts, para (i): ‘A failure of the selected element of a multi-mode landing system during an approach should be accompanied by a warning or caution, as appropriate. These alerts may be inhibited at the alert height, if appropriate to the operation’.
- AWO.A.SVGS.103 (g) ‘Alerts (warning or caution level, as appropriate) to inform the flight crew when the SVGS function is lost or degraded…’

In summary the TST could find nothing in the regulation that would support a mandatory Warning-level alert for loss of guidance during an instrument approach. Moreover, the TST could not find a convincing operational argument that would justify a Warning-level alert. Immediate pilot awareness of loss of guidance was agreed to be required, but the timing and nature of the subsequent flight crew response was dependent on multiple factors that the alerting system would not be able to determine (e.g. VMC/IMC). The TST also observed that a Warning alert after transition to visual, which may occur above the approach minima, would be a significant distraction, just when it is not required.

Conclusion

The CMT 25.1322 TST considers that in the event of loss of guidance during an instrument approach, as defined above, a Warning is not mandated.

2.2 Criteria for application of TST Policy on failure flags on Primary Flight Display (PFD)

The TST task was to provide scenarios along with criteria for application of the policy on the PFD, generated during Phase I, due to multiple conditions of already approved aircraft.

Phase I policy

The main part of the Phase I policy is restated below. It applies to finding compliance with CFR 25.1322 Amendment 131 and CS-25 Amendment 11, AWM 525.1322 Change 525-22 and RBAC 25.1322 Amendment 131.

> **Moving forward, for programs with regulation 25.1322, the amendments listed above, regarding failure flags on Primary Flight Displays:**
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> **- Any visual indication identifying to the flightcrew a non-normal operational or airplane system condition (including but not limited to Failure Flags) on the Primary Flight Display (PFD) is considered part of the alerting function and must be compliant with the regulatory requirements of regulation 25.1322 (a) through (e). It is assumed that the applicant has followed the categorization of alerts outlined in AC 25.1322-1/AMC 25.1322 Sections 5 and 6 in meeting the requirements of 25.1322(b) in terms of the prioritization hierarchy and 25.1322(e) in terms of the use of colors.**

Phase II discussion

The CMT 25.1322 TST discussed and agreed on the criteria for application of the above policy from Phase I regarding failure flags displayed on Primary Flight Displays (PFDs).

There are already approved aircraft designs following the latest 25.1322 rule that did not follow the interpretation above. Some of these cases already have an agreement reached for re-design of PFD failure flags (e.g. through time-limited exemptions), which will be considered as valid by all the CMT authorities, regardless of the criteria for the policy's application provided below.

In cases where there is no such agreement, then the criteria below apply for changes to these previously approved Part 25 designs that did not follow the above policy.

Criteria for application of the Phase I policy

For changes affecting the flight-crew alerting function, including alerts in the Primary Flight Displays, the application of the policy will depend on the scope of the change. Three specific cases are detailed below. For other cases, the application of the policy will be discussed on a case-by-case basis.

1. If the change is limited to changing the logic of a current PFD visual information: as the visual representation and intended function would remain unaffected, the current policy above will **not** apply. *For example: changing an activation parameter such as the "debounce" time, alert inhibits or other aspects regarding the logic for activating or removing the visual information.*

2. If the change is related to adding a new visual element on the PFD, the current policy will apply, unless the certification authority concludes that following the policy would be inappropriate. *An example of adding a new visual element would be to include a "NO LVTO" visual element on the PFD for showing the unavailability of a Low Visibility Take-off (LVTO) function.*

3. If the change is considered to be an extensive change in terms of the displays design, including the PFD, it is expected that the applicant re-designs all the PFD visual elements of alerts according to the current policy above. The policy applies regardless of the classification of the change per 21.101 or the designation of a new model by the applicant. This includes changing from one display design concept or philosophy to another one, even if there is no supplier change nor inclusion of new visual elements of alerts on the PFD. *For example: a change from one Avionics suite to another or the introduction of touchscreen on the PFD.*

2.3 Policy for recording partial compliance with regulation 25.1322.

Given the integrated nature of 25.1322, the TST policy is:

- Compliance credit for the latest amendment of section/regulation 25.1322 can only be obtained if the entire section/regulation 25.1322 is complied with, not individual paragraphs.
- Applicants are encouraged to step up to the latest amendment even partially, however compliance credit cannot be given unless the applicant complies with the latest amendment of the entire section/regulation 25.1322.
- The TCDS/STC should reflect the amendment level for which complete compliance credit was found.
- Changes to affected areas that have been shown to comply with the latest amendment of the entire section/regulation 25.1322 should also be documented on the TCDS/STC.

The intent of this policy is to clearly document the extent of compliance and avoid issues for future modifications/projects. That does not preclude applicants to improve their designs by following parts of the updated section/regulation.